EXHIBIT 1

US006827901B2

(12) **United States Patent**
Copeland et al.

(10) **Patent No.: US 6,827,901 B2**
(45) **Date of Patent: Dec. 7, 2004**

(54) **AUTOMATED BIOLOGICAL REACTION APPARATUS**

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(73) Assignee: **Ventana Medical Systems, Inc.**, Tucson, AZ (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/137,169**

(22) Filed: **May 2, 2002**

(65) **Prior Publication Data**

US 2002/0114733 A1 Aug. 22, 2002

Related U.S. Application Data

(63) Continuation of application No. 09/931,513, filed on Aug. 16, 2001, which is a continuation of application No. 09/452,309, filed on Dec. 1, 1999, now Pat. No. 6,352,861, which is a continuation of application No. 08/906,678, filed on Aug. 5, 1997, now abandoned, which is a continuation of application No. 08/479,415, filed on Jun. 6, 1995, now Pat. No. 5,654,200, which is a division of application No. 08/352,966, filed on Dec. 9, 1994, now Pat. No. 5,595,707, which is a continuation of application No. 07/924,052, filed on Aug. 31, 1992, now abandoned, which is a continuation-in-part of application No. 07/488,601, filed on Mar. 2, 1990, now abandoned.

(51) **Int. Cl.**[7] **G01N 35/00**

(52) **U.S. Cl.** **422/64**; 422/62; 422/67; 436/43; 436/45; 436/46; 436/54; 436/55

(58) **Field of Search** 436/43, 45, 46, 436/48, 49, 54–55; 422/62, 64, 67

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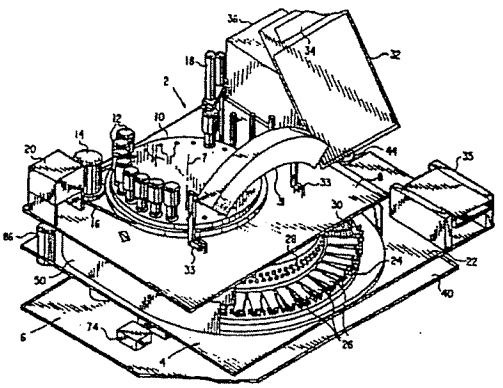
Primary Examiner—Lyle A. Alexander
(74) *Attorney, Agent, or Firm*—McDonnell Boehnen Hulbert & Berghoff LLP

(57) **ABSTRACT**

An automated immunostaining apparatus having a reagent application zone and a reagent supply zone. The apparatus has a carousel slide support supporting a plurality of slide supports thereon, and drive means engaging the carousel slide support for consecutively positioning each of a plurality of slide supports in the reagent application zone. The apparatus also has a carousel reagent support having a plurality of reagent container supports thereon, and drive means engaging the carousel for rotating the carousel and positioning a preselected reagent container support in the reagent supply zone. The apparatus also has a reagent delivery actuator means positioned for engaging a reagent container positioned on a container support.

45 Claims, 37 Drawing Sheets



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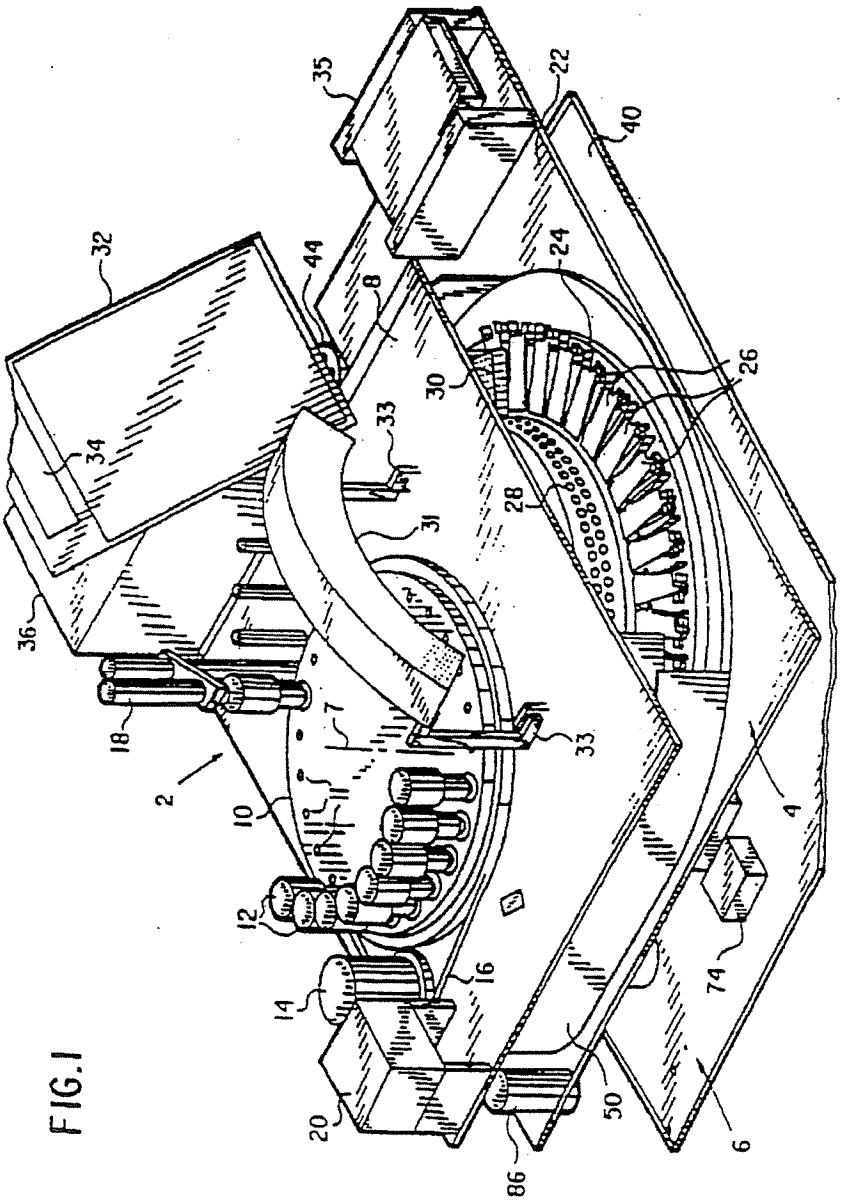
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FIG. 1

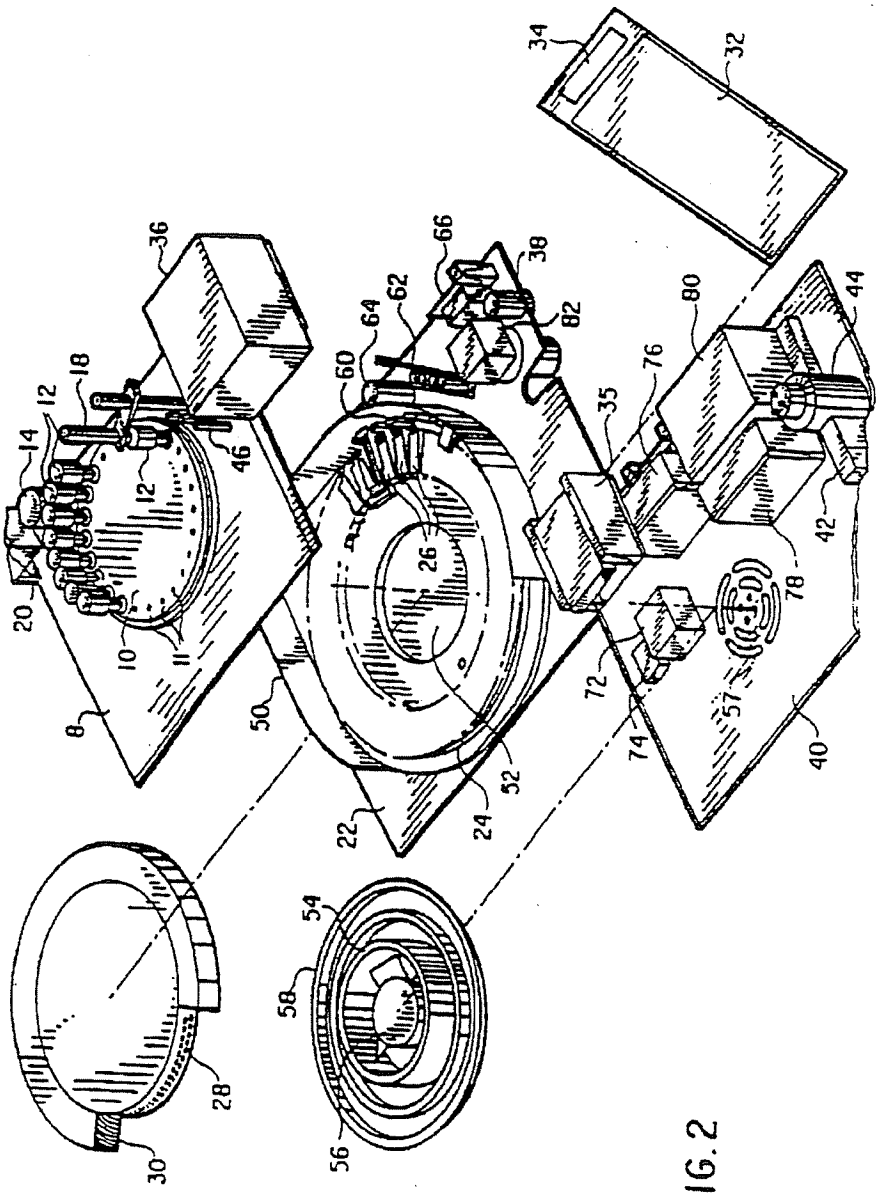
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FIG. 2

FIG.3

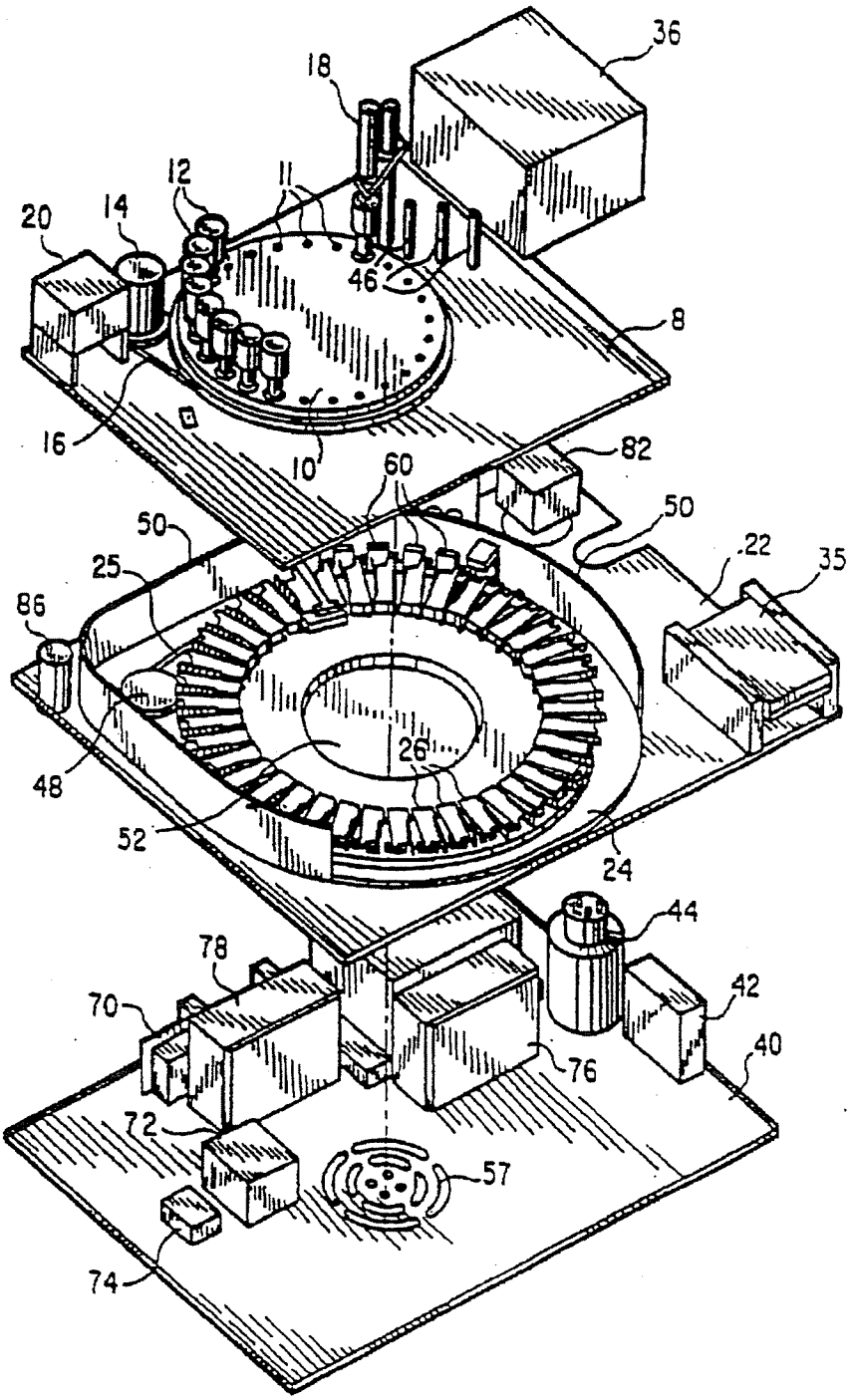
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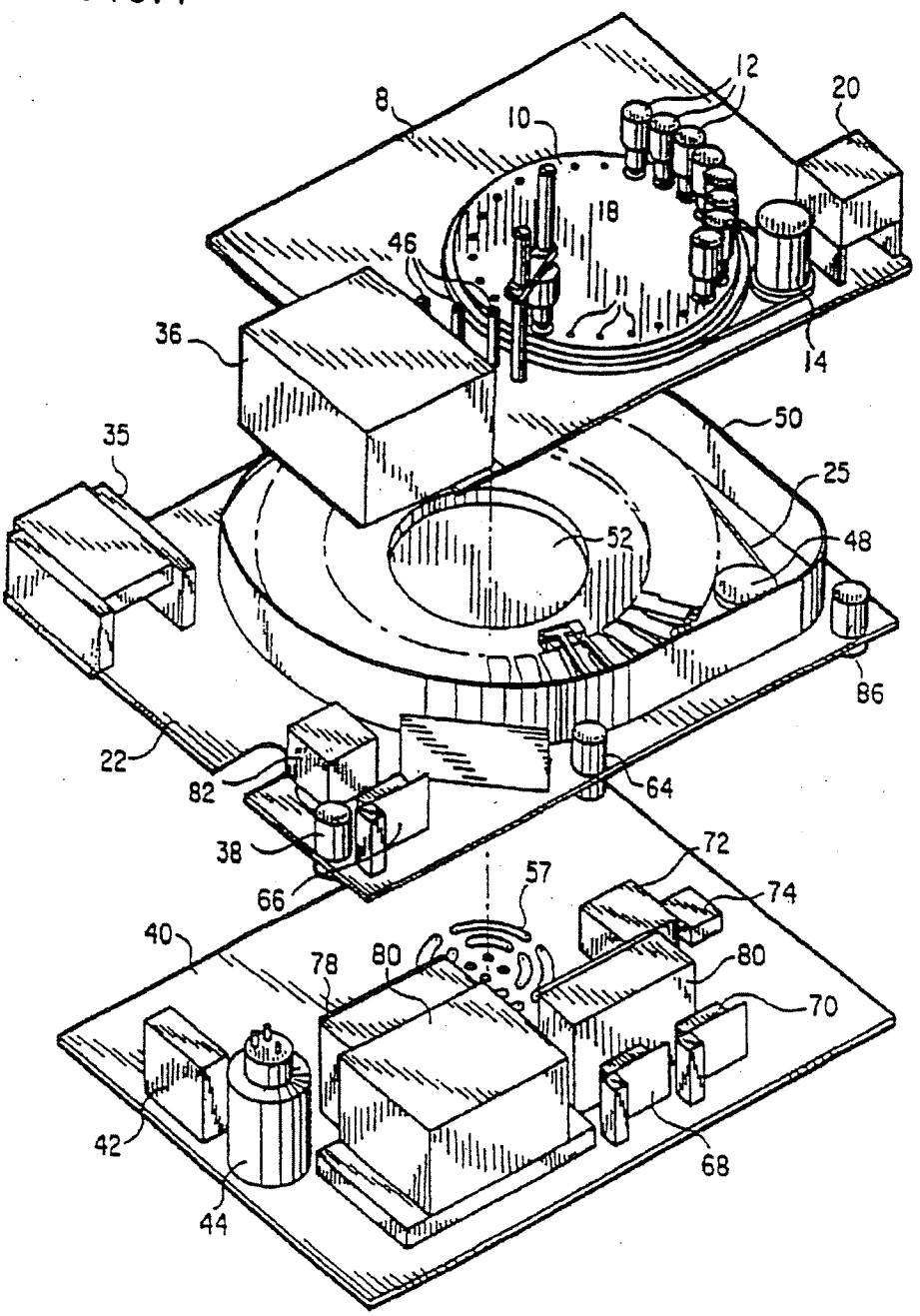
FIG.4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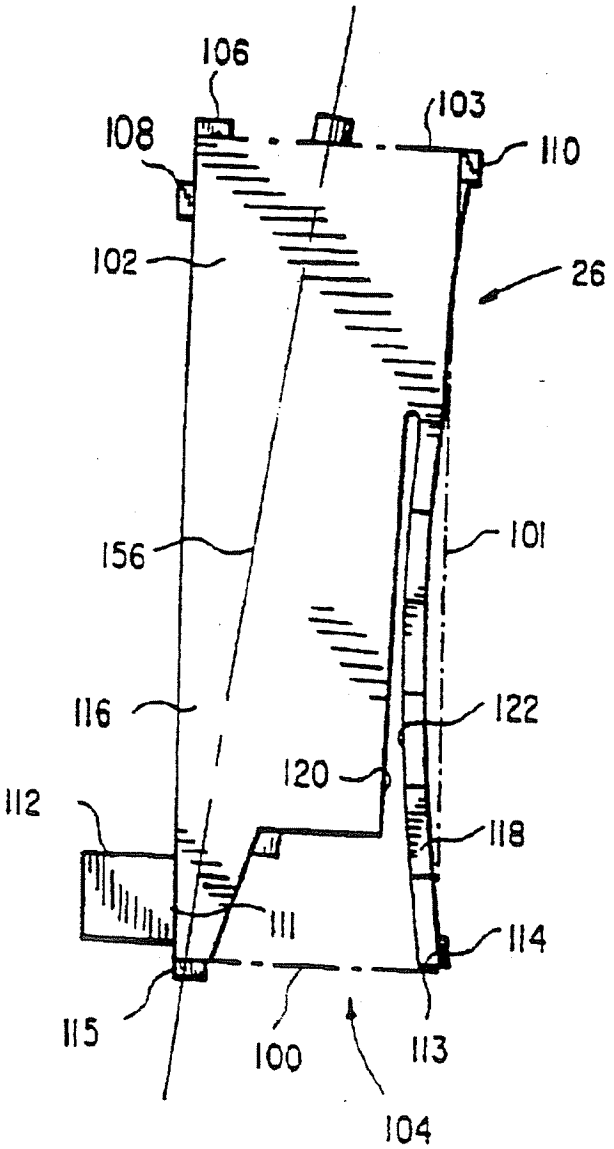
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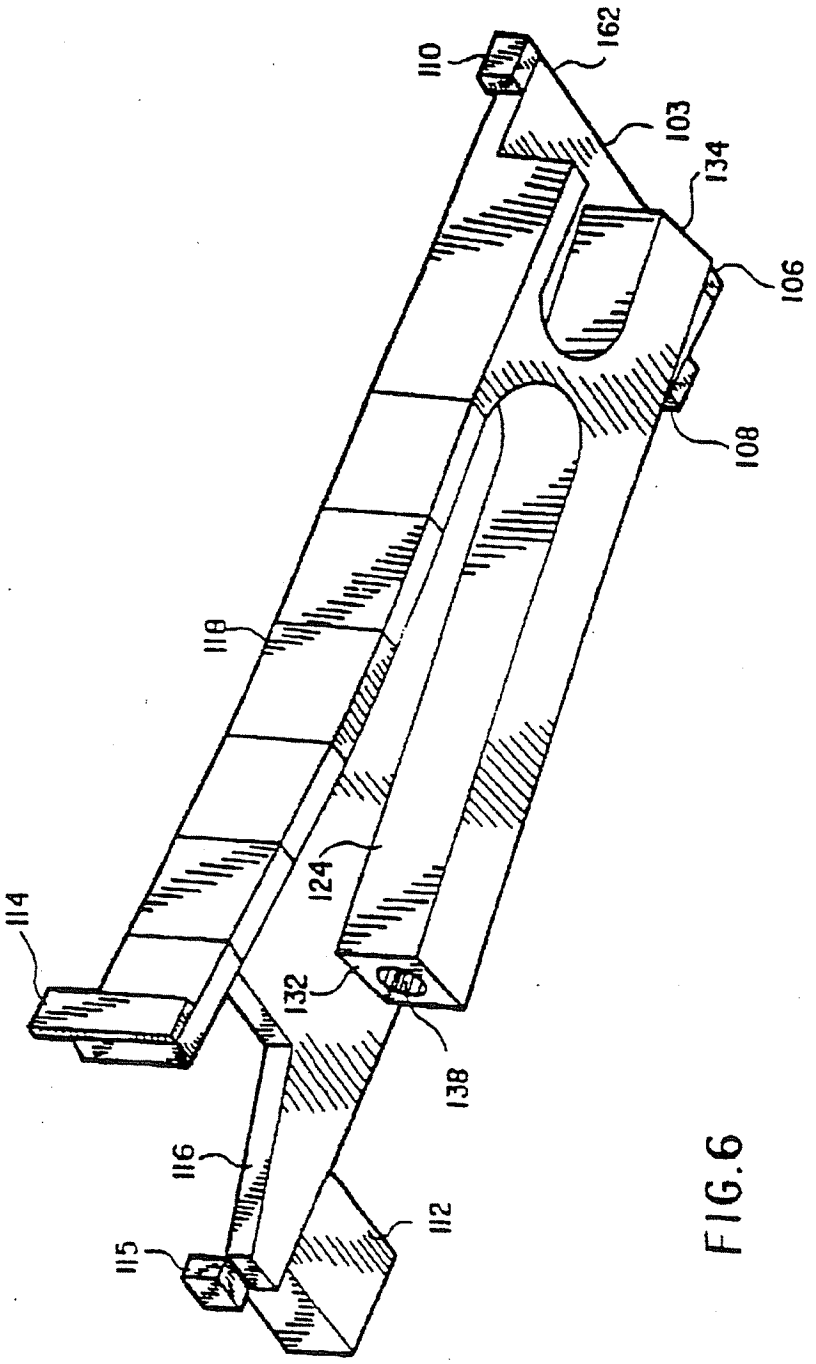

FIG. 6

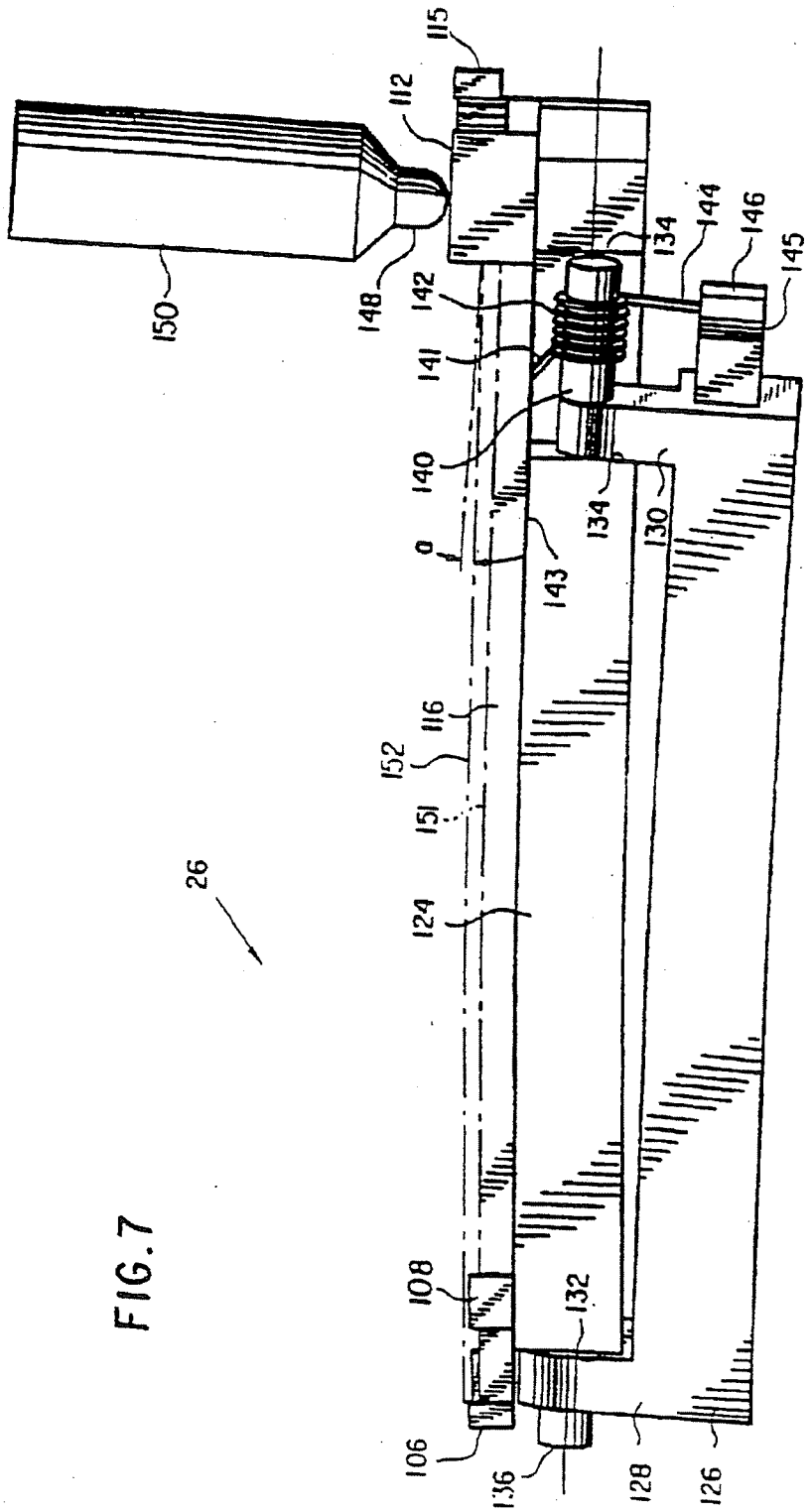
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FIG. 7

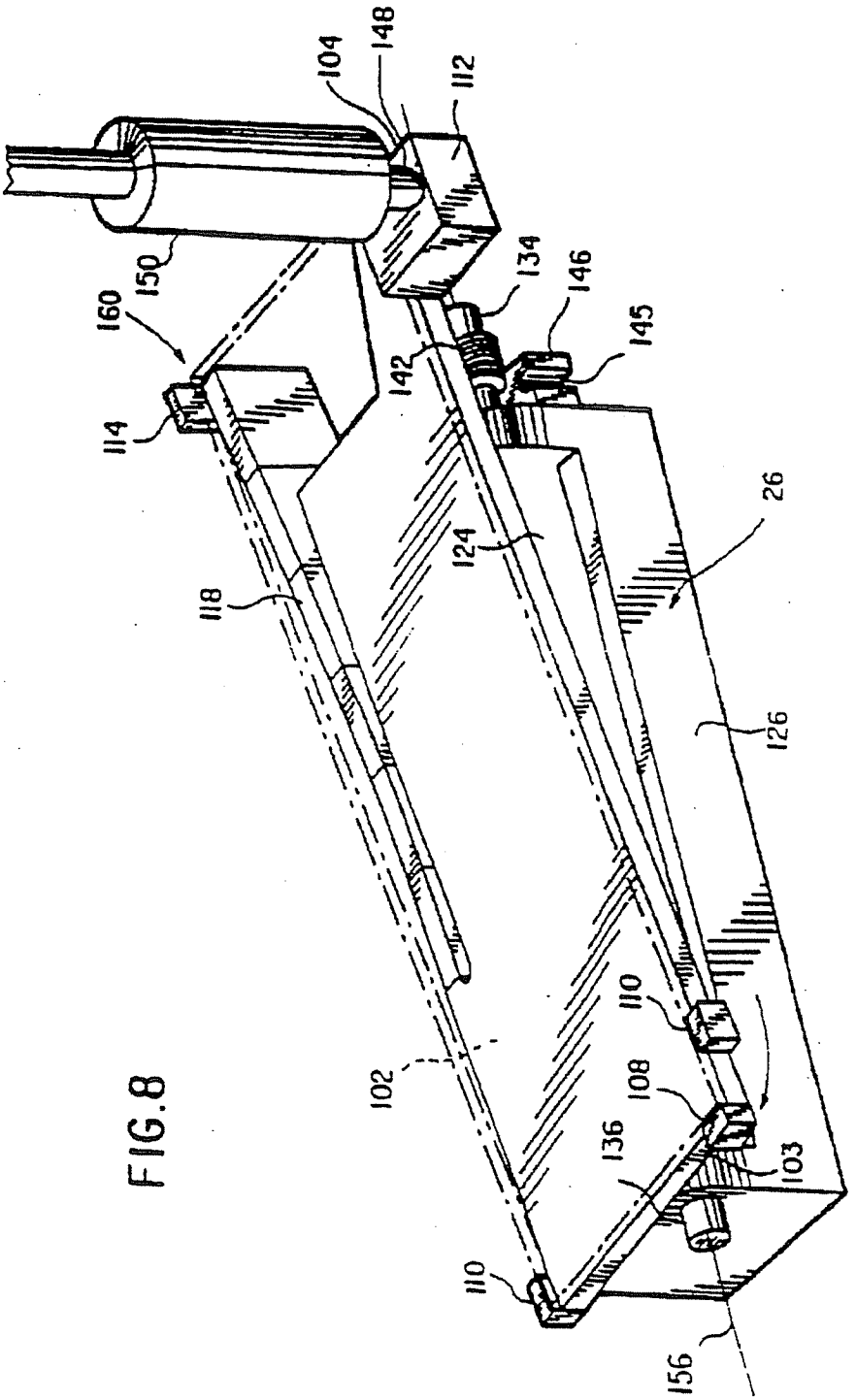
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FIG.8

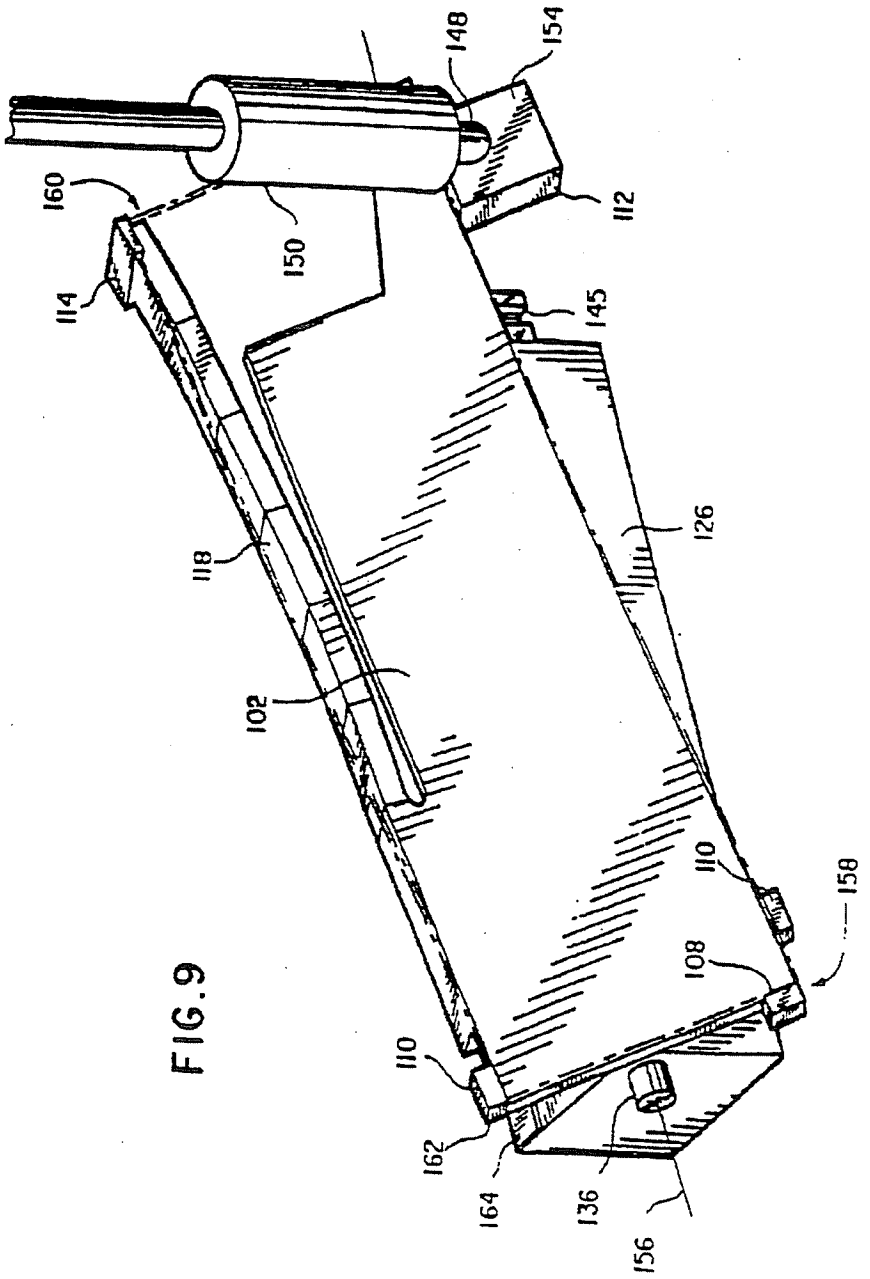
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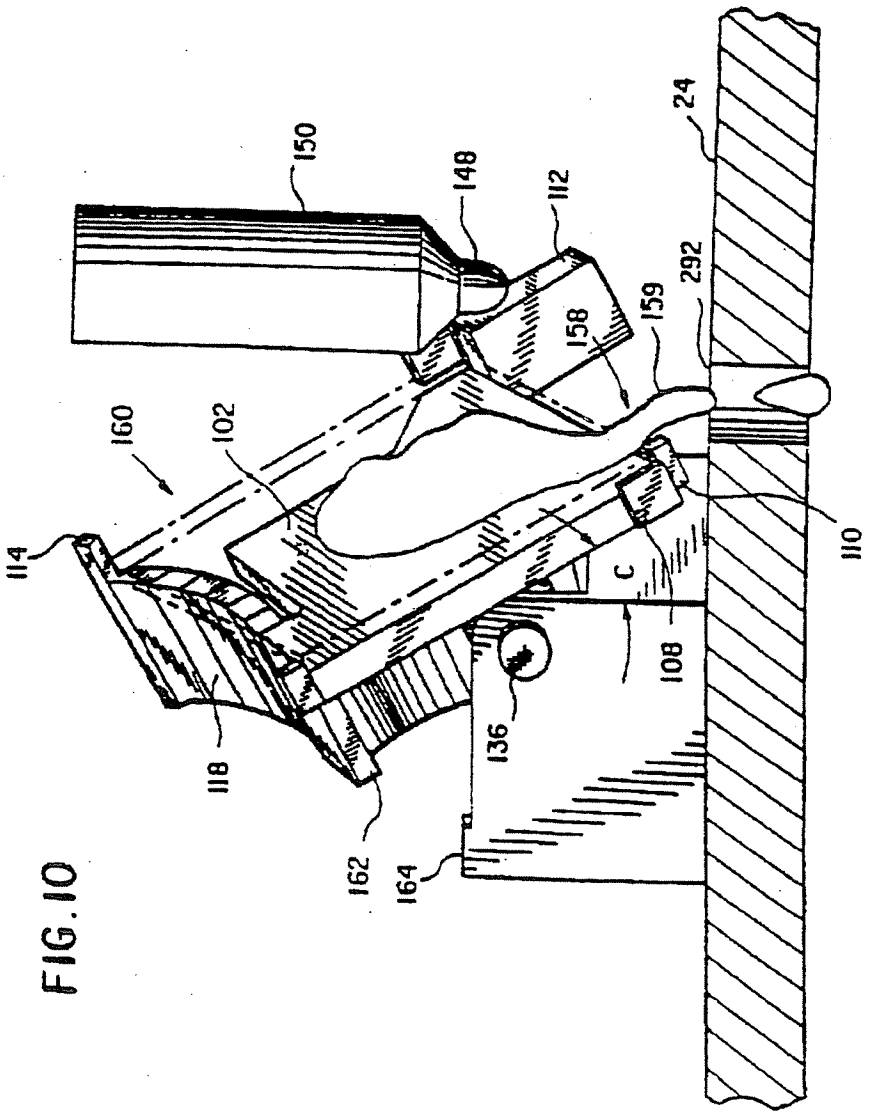
FIG. 9



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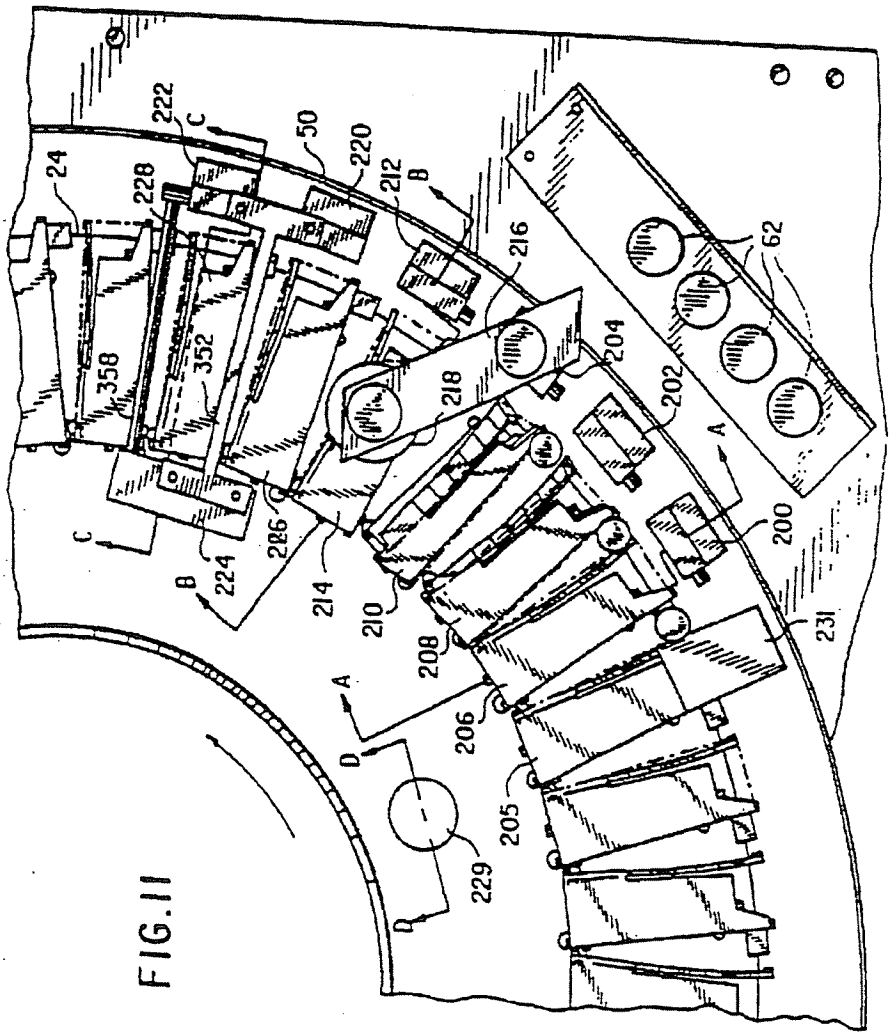
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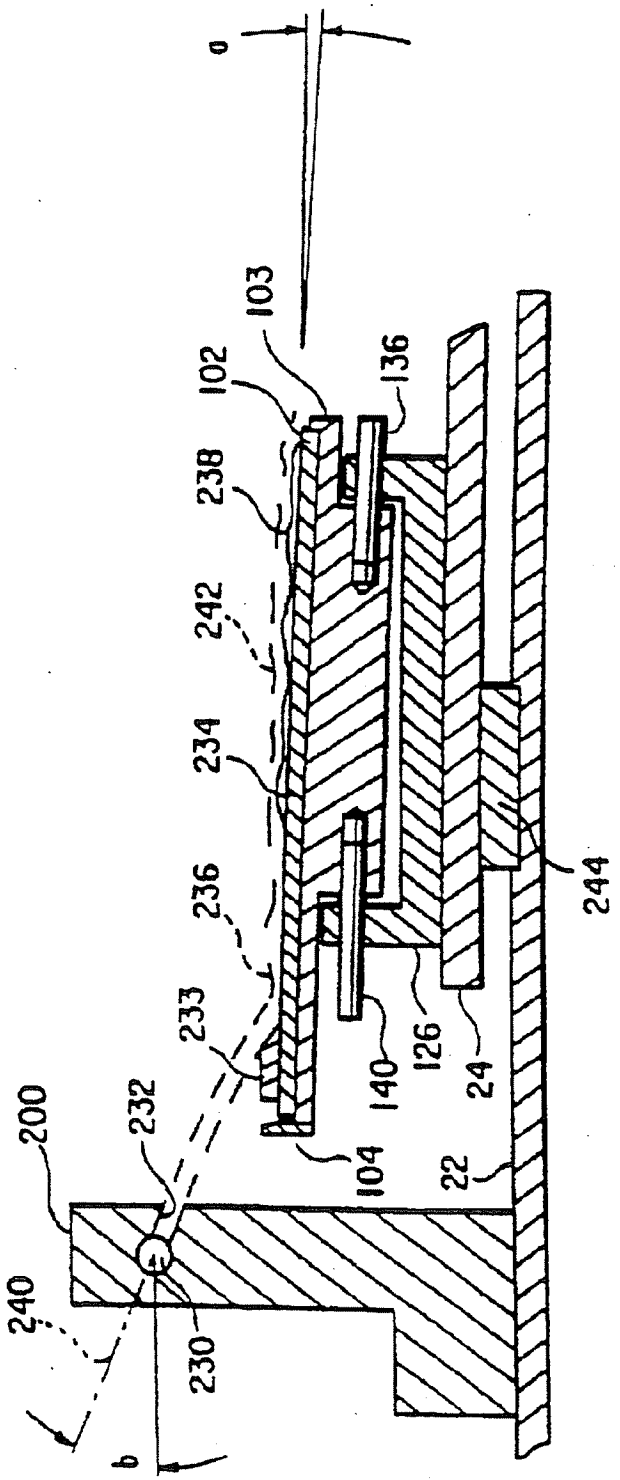
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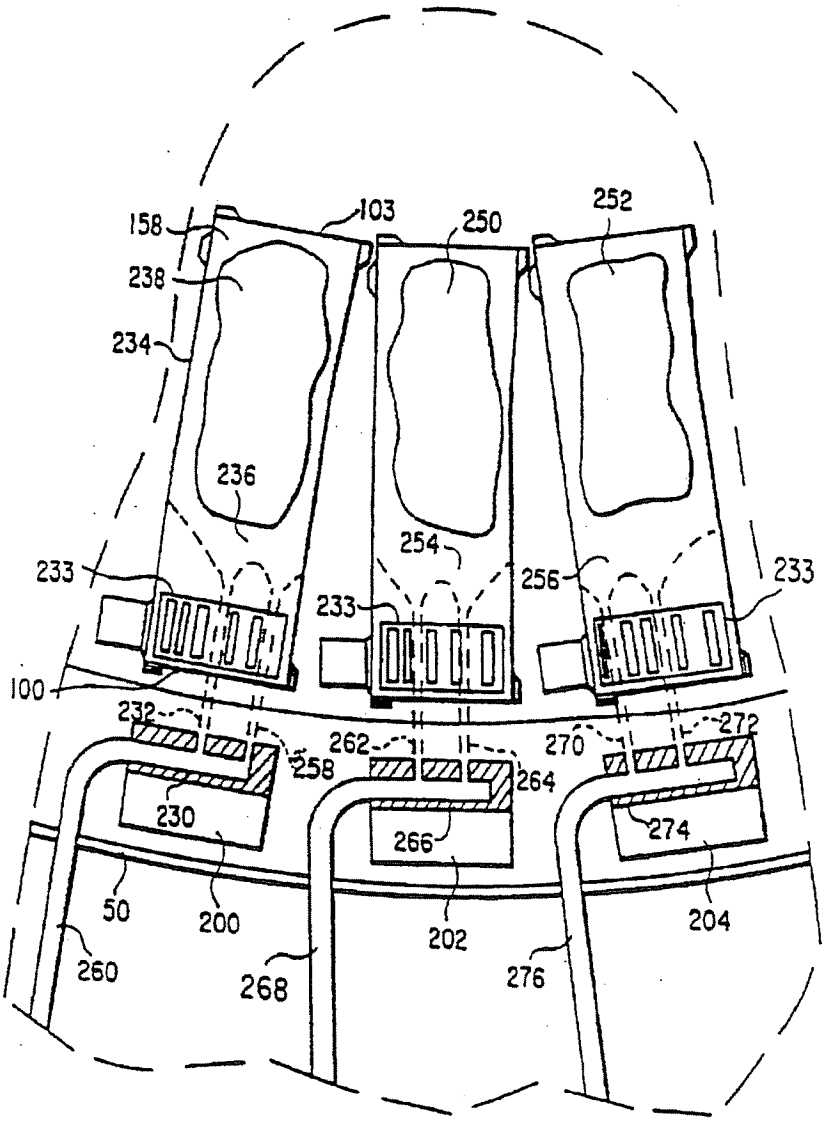
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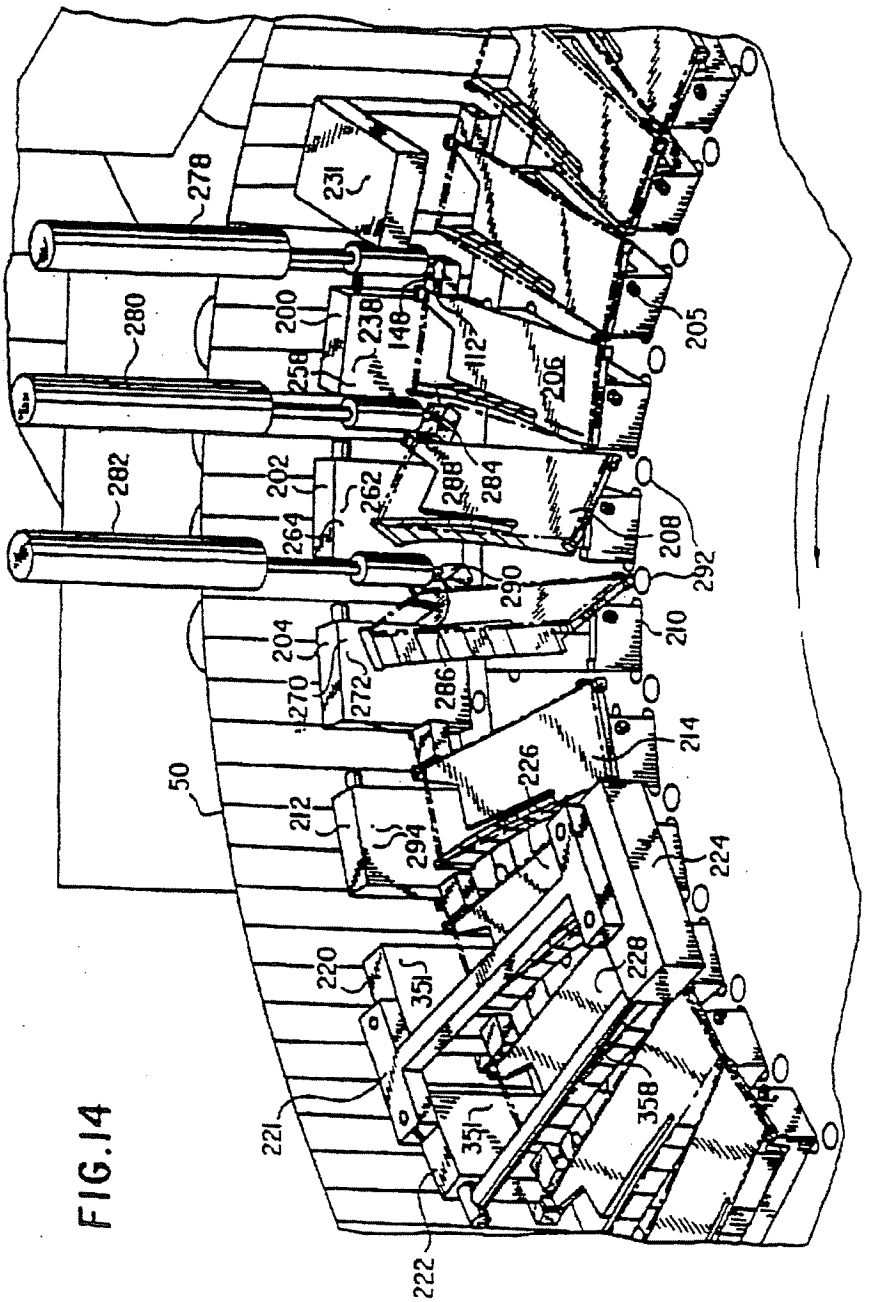
FIG.13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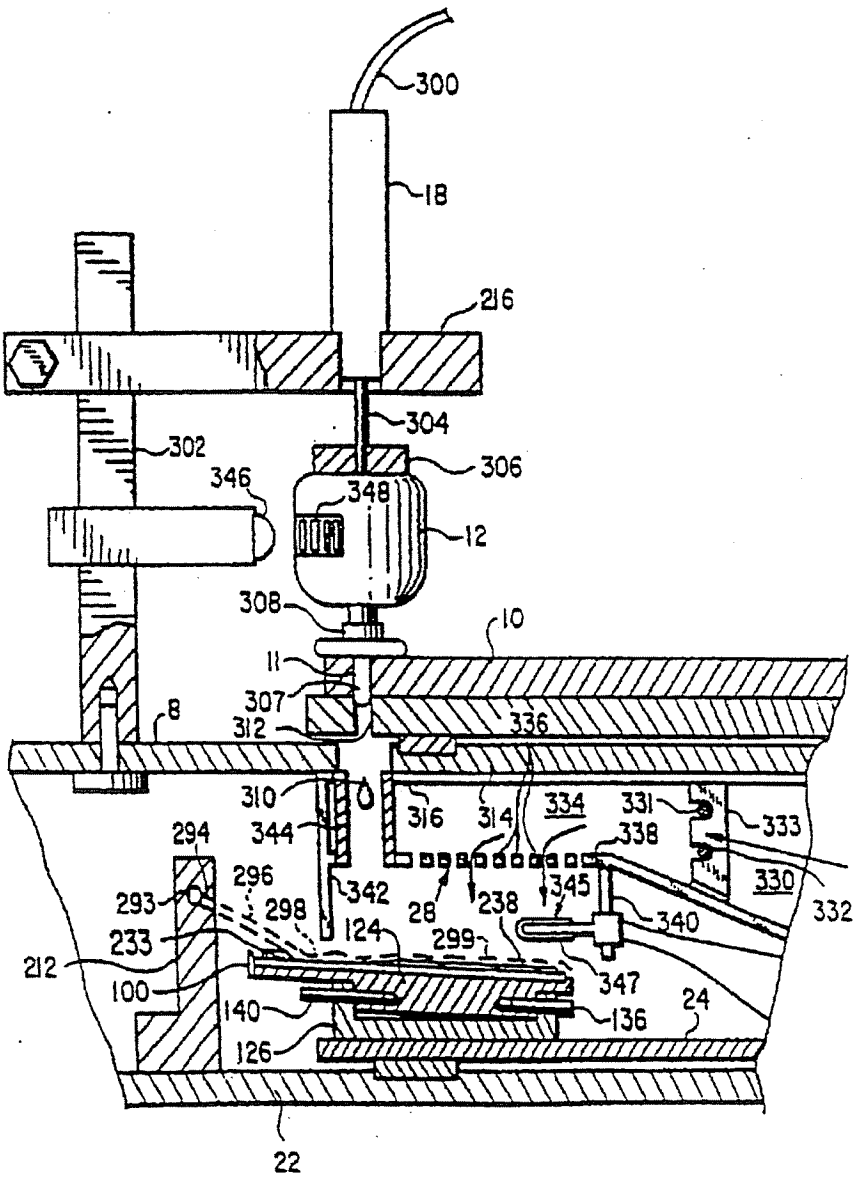
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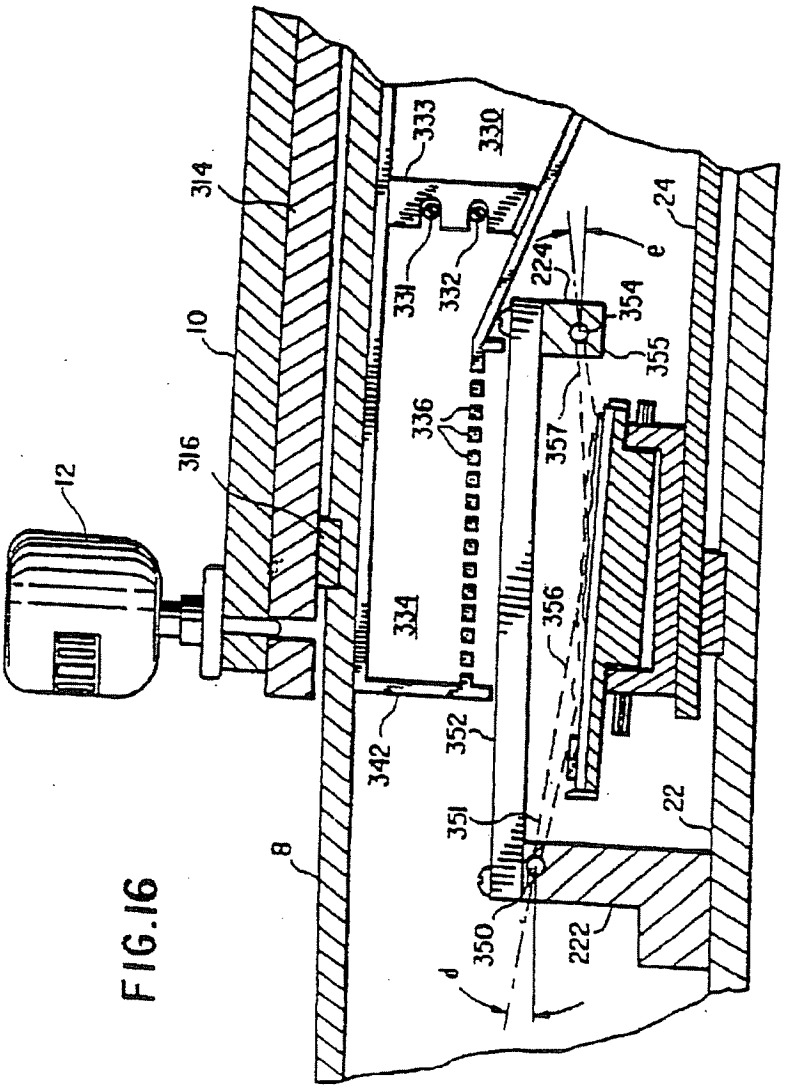
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FIG.16

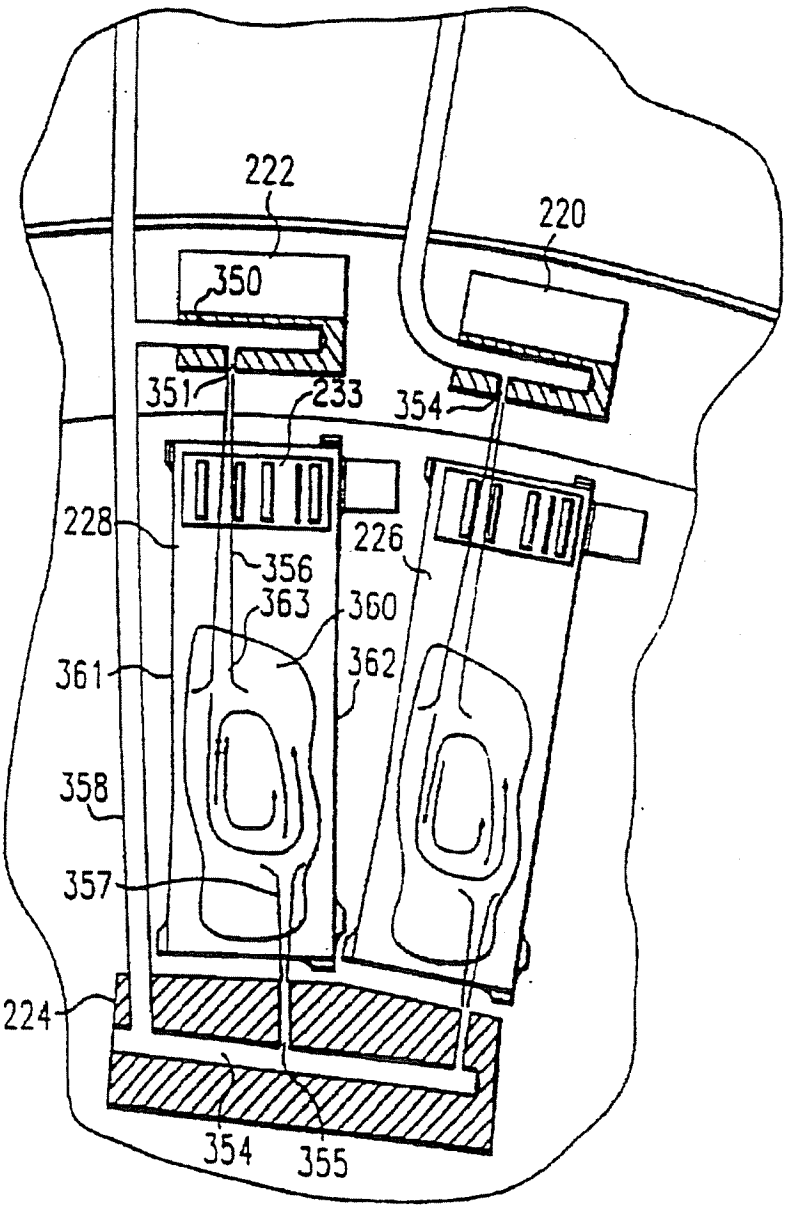
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FIG. 17

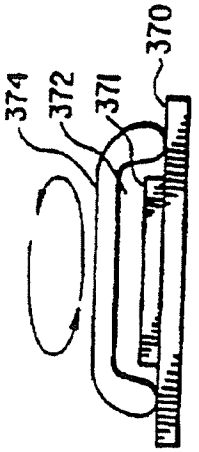


FIG. 18C

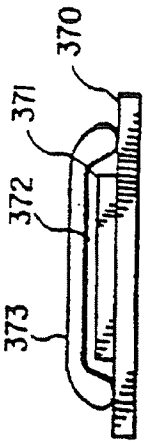


FIG. 18B

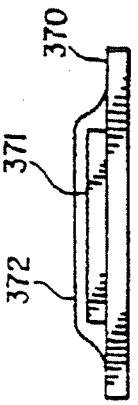
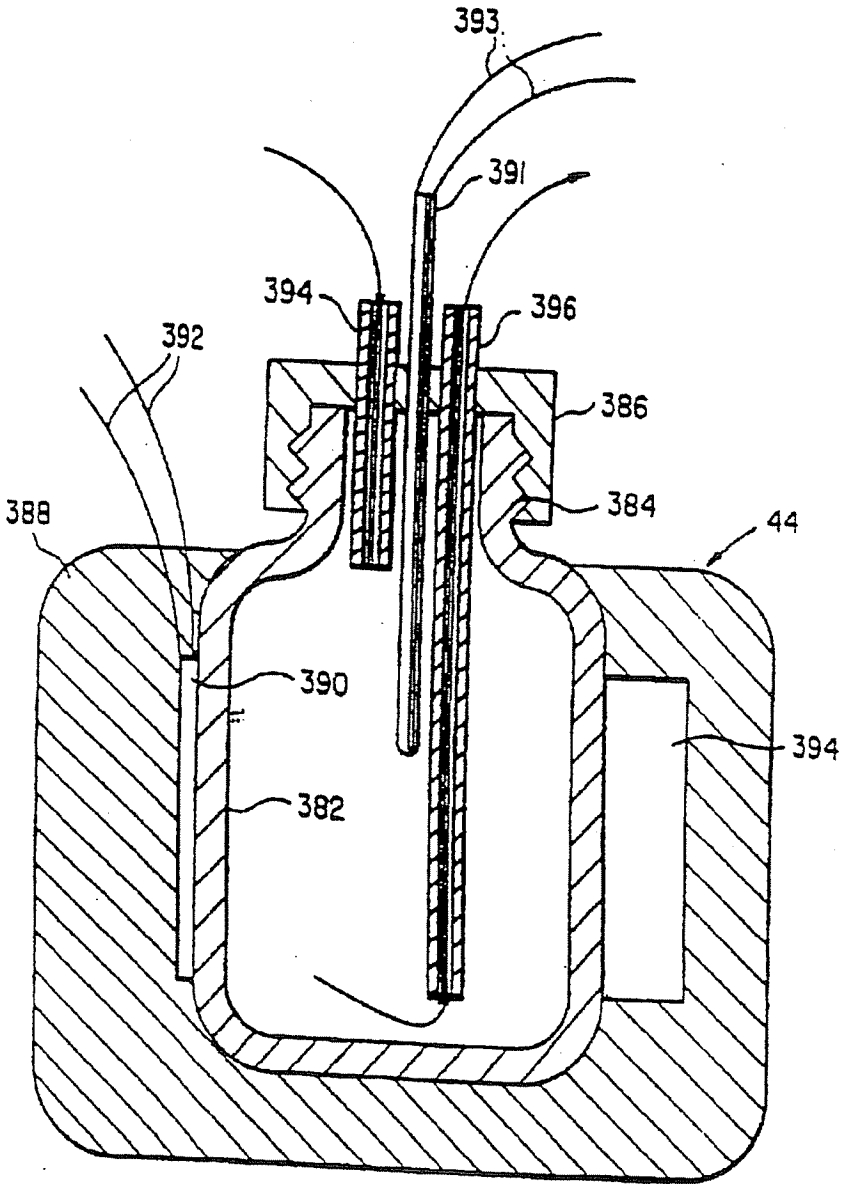


FIG. 18A



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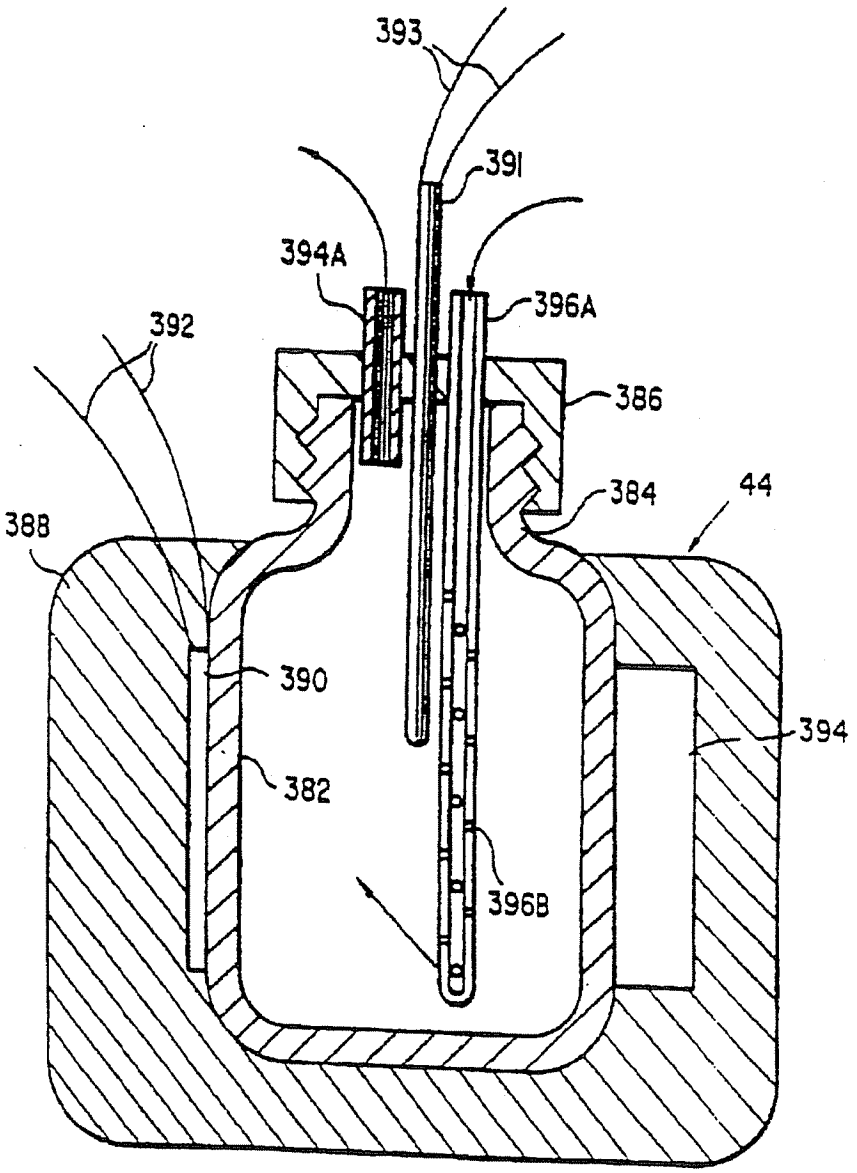

FIG.19B

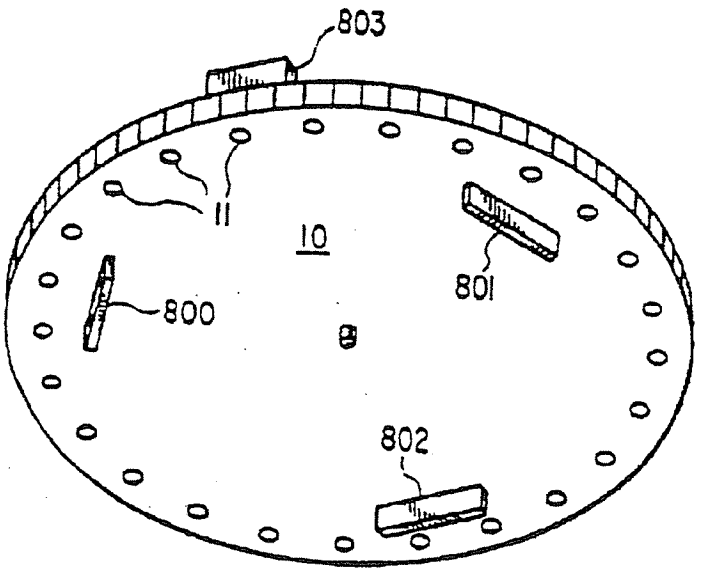

FIG.20A

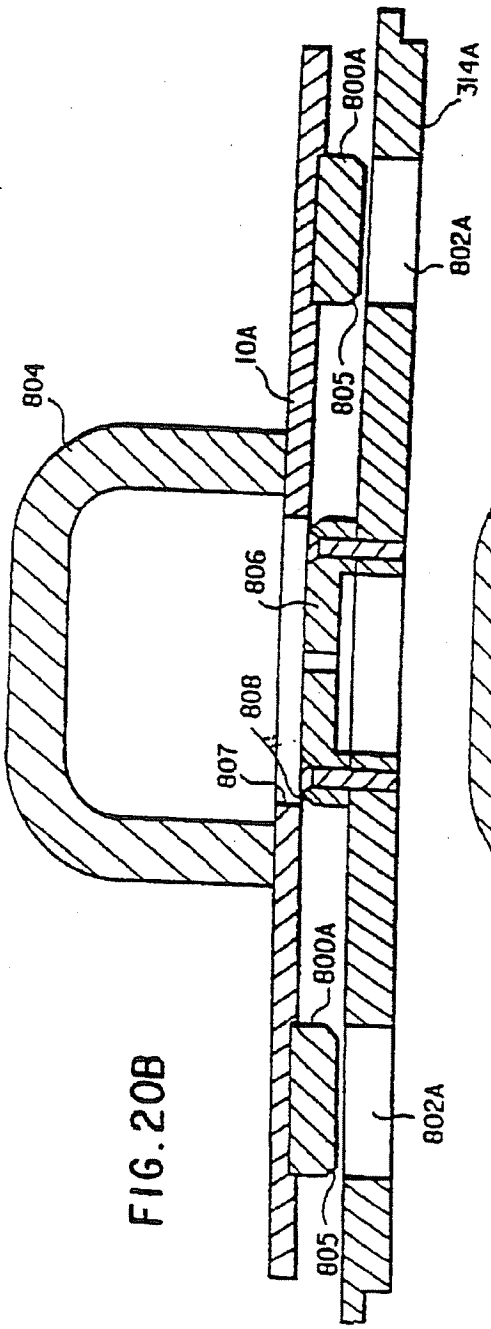

FIG. 20B

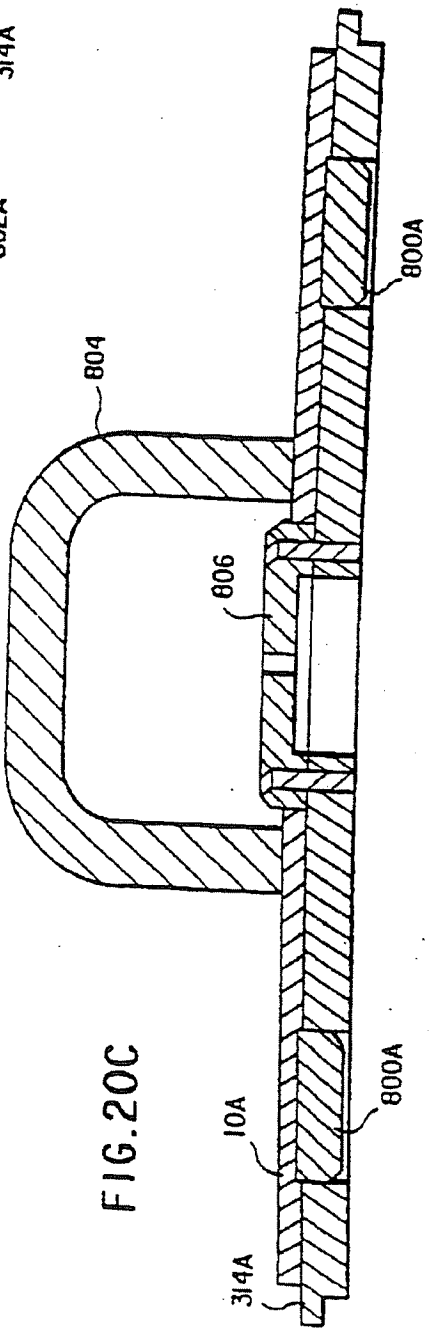

FIG. 20C

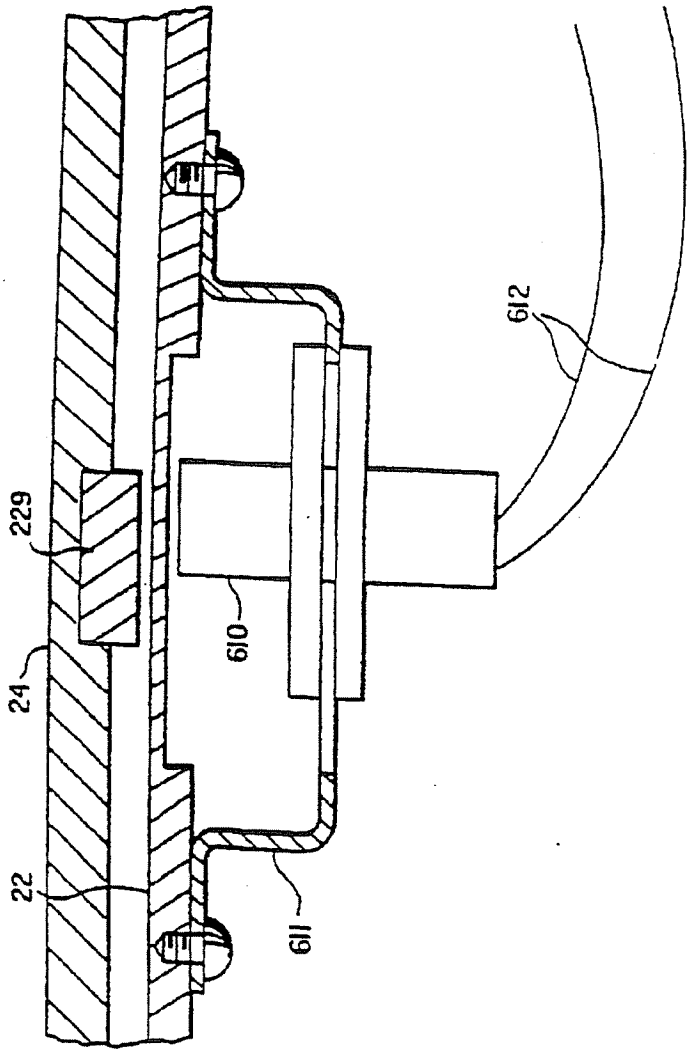

FIG. 21

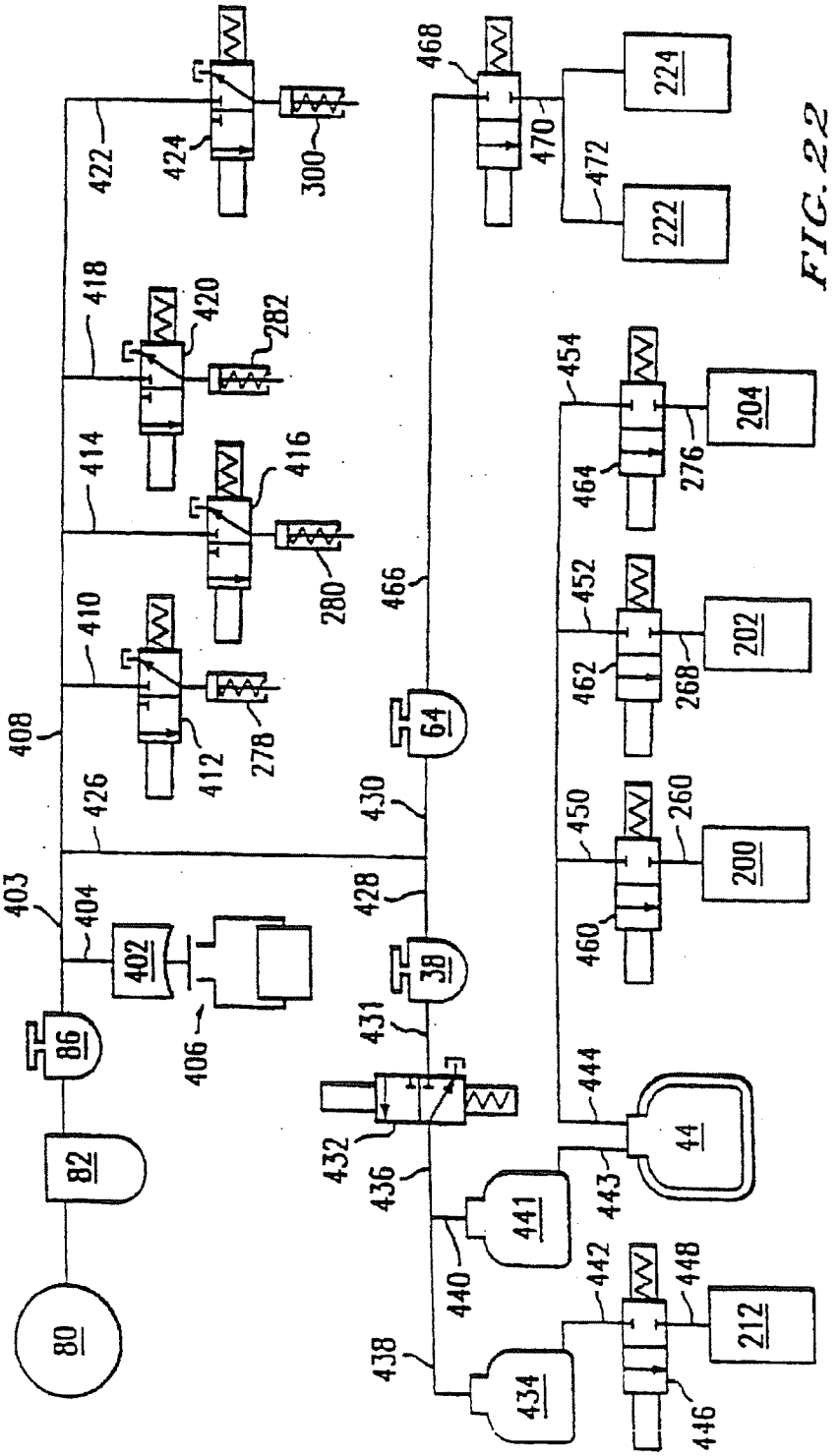
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FIG. 22

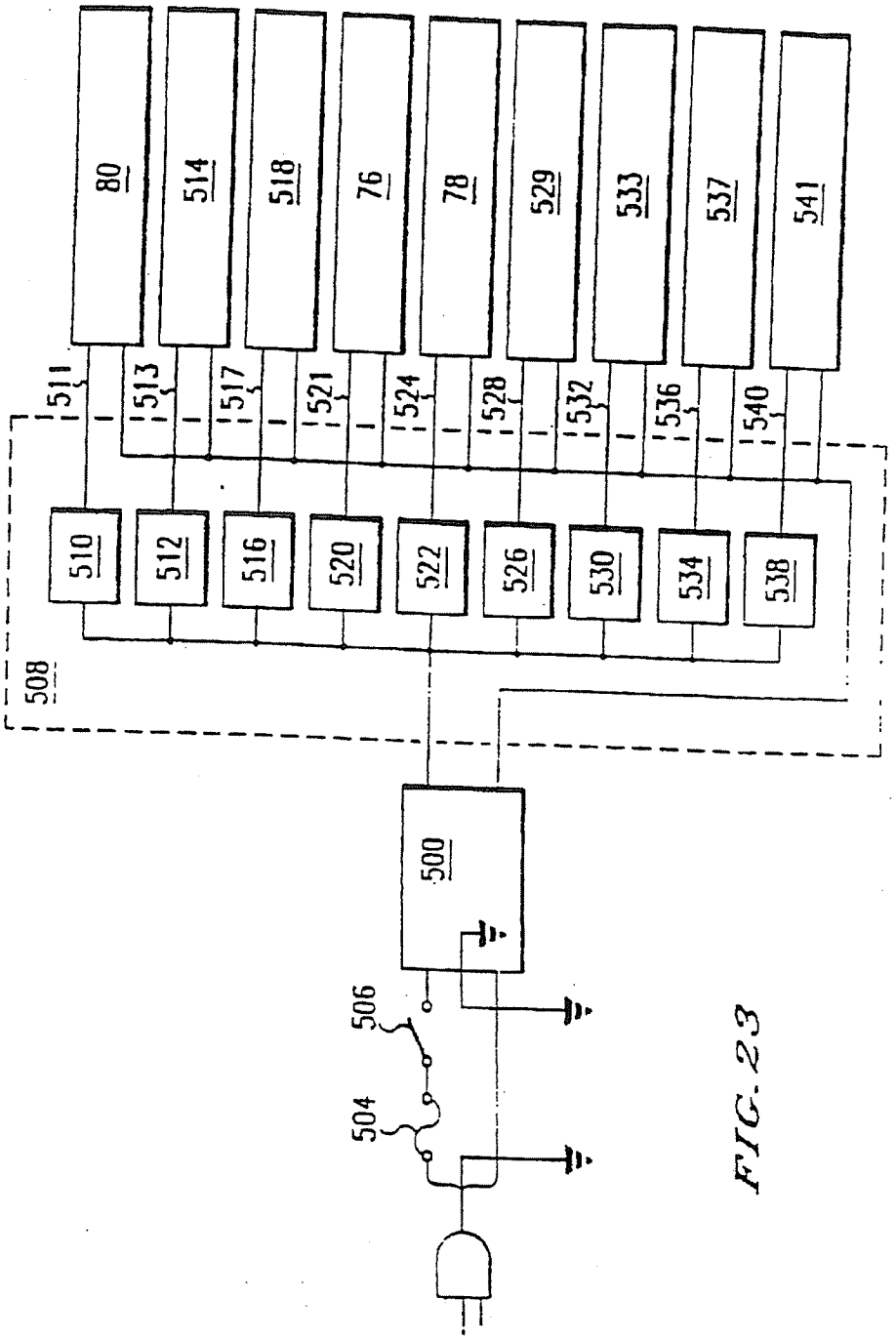
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FIG. 23

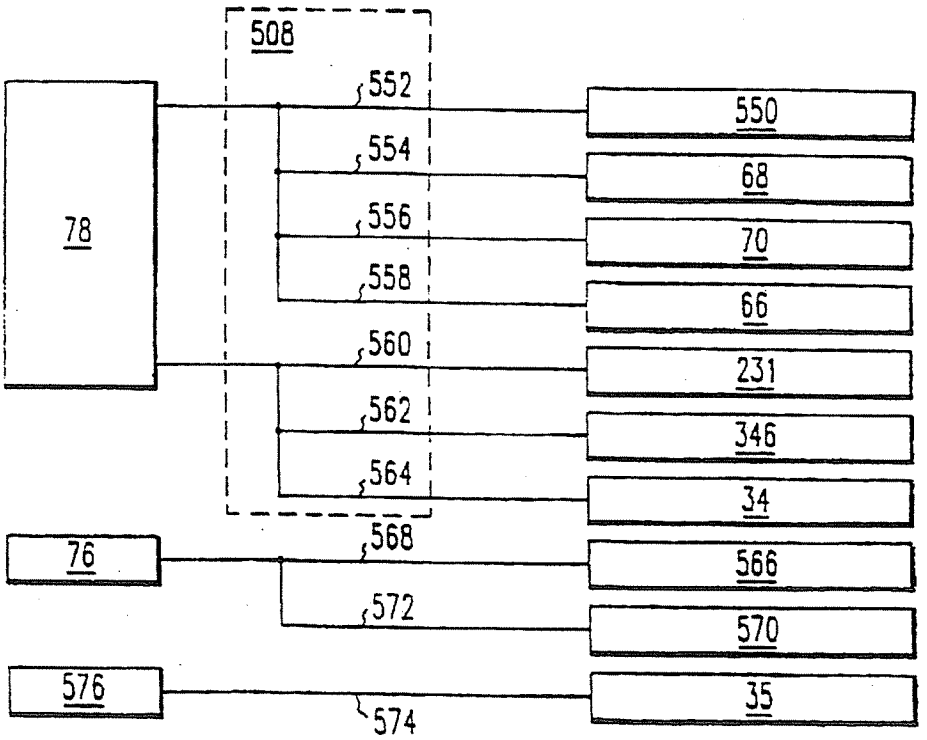
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FIG. 24

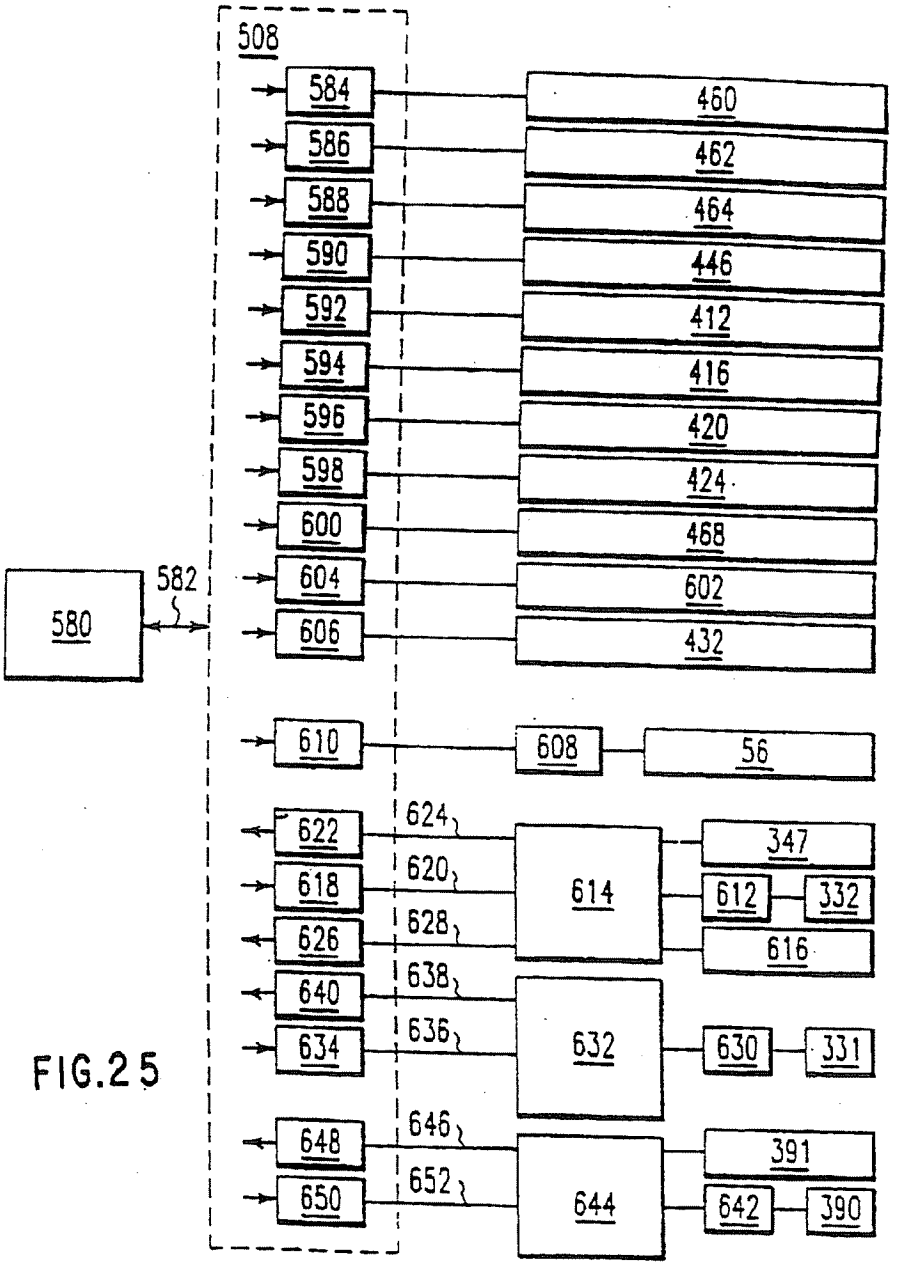
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FIG. 25

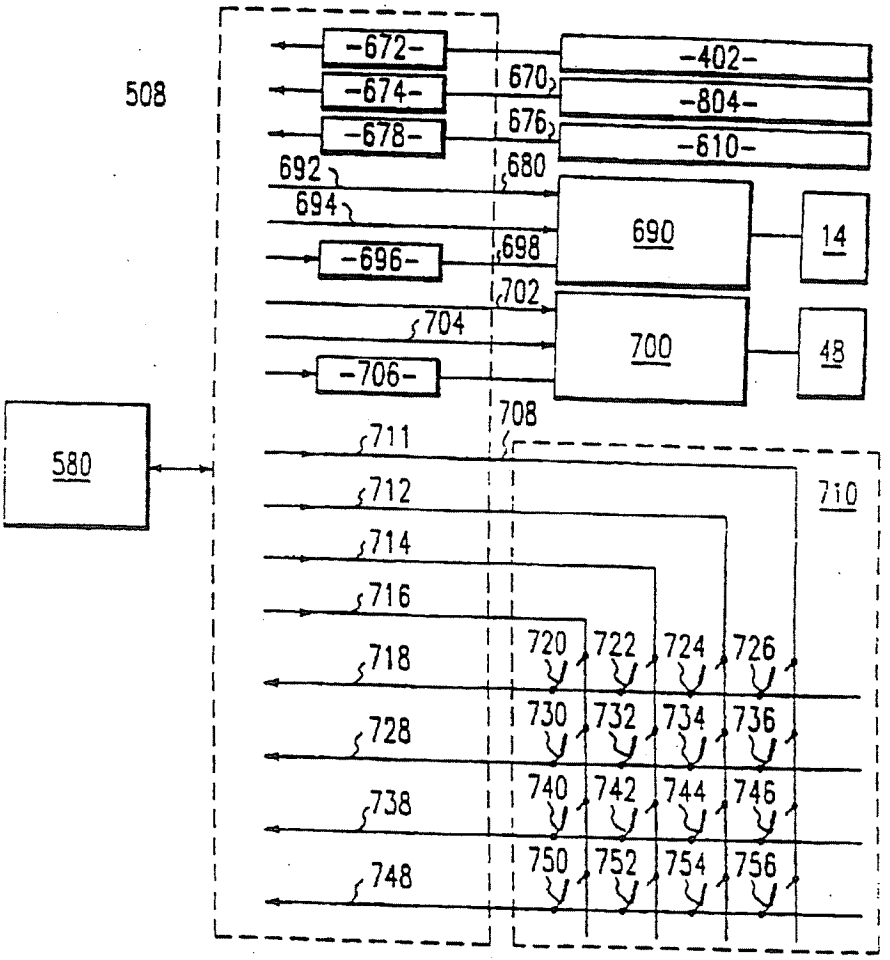
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FIG. 26

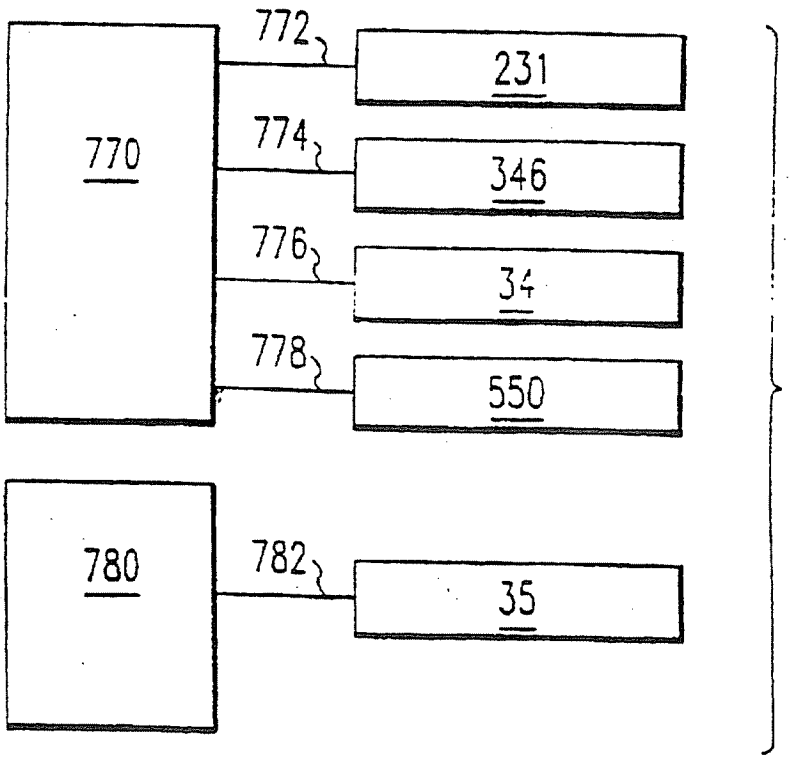
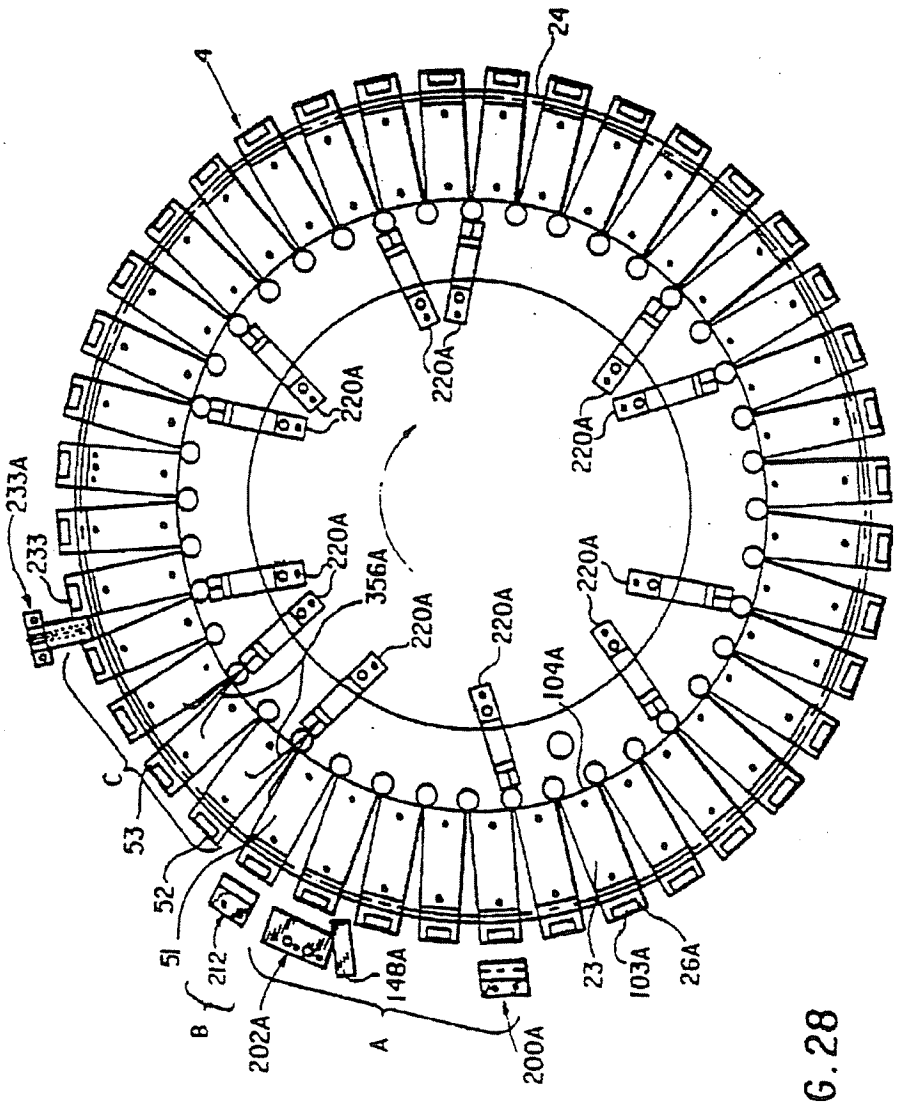


FIG. 27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202A
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23
103A
26A
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B
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FIG. 28

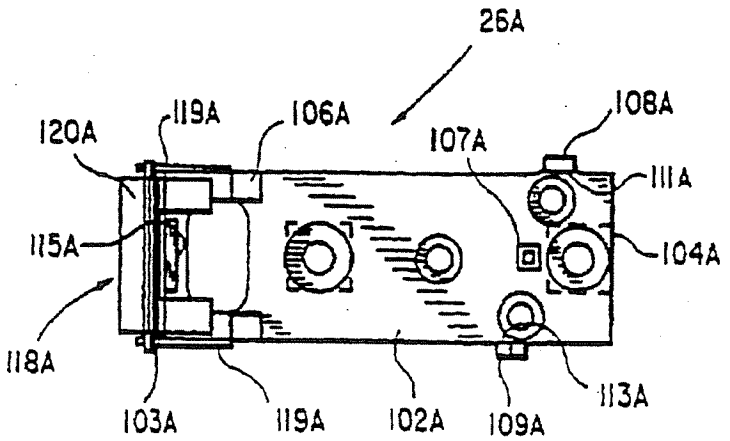

FIG. 29A

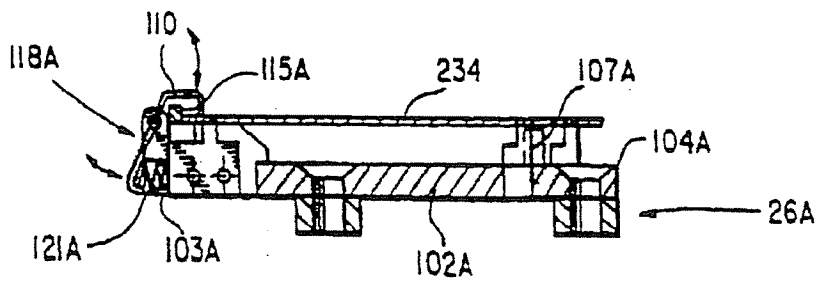

FIG. 29B

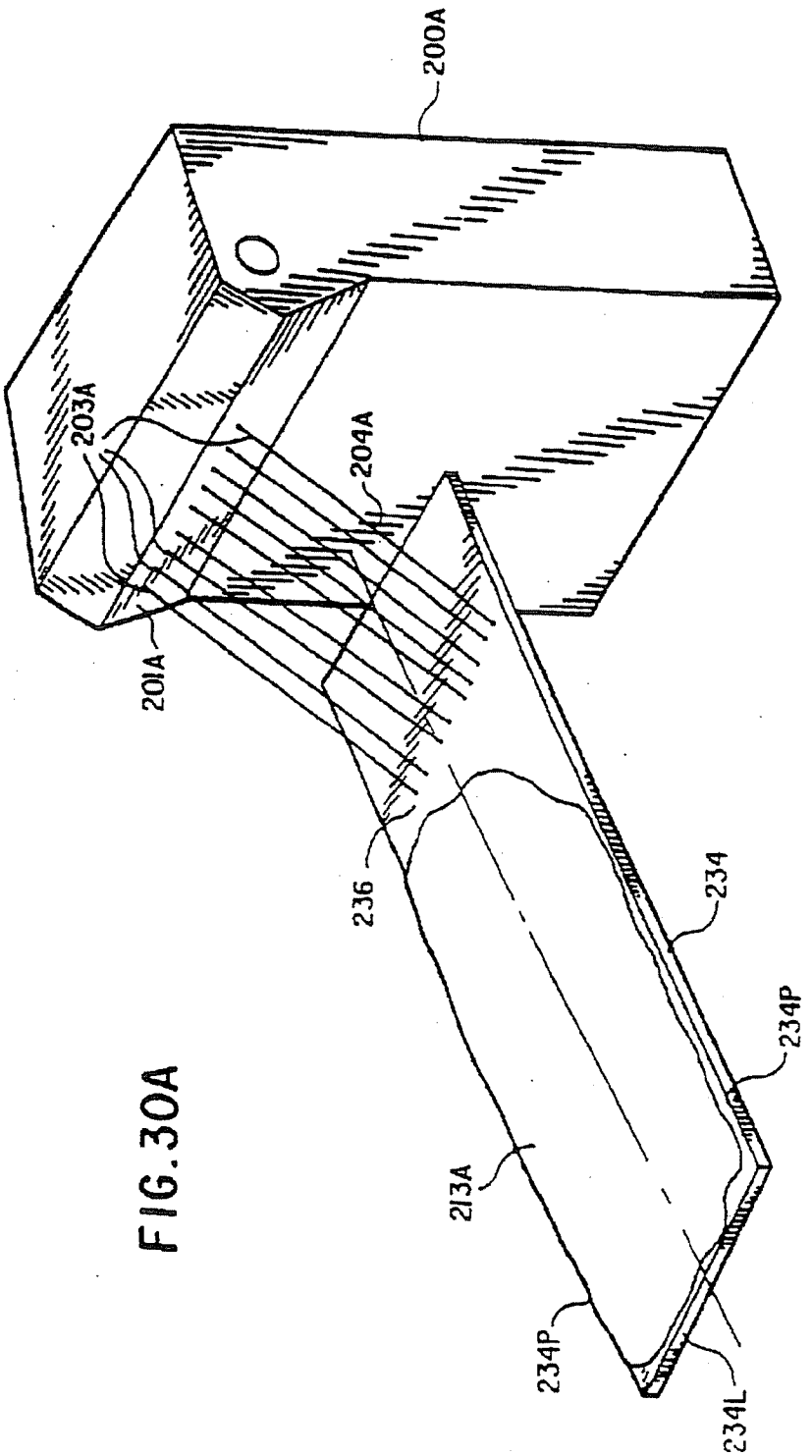

FIG. 30A

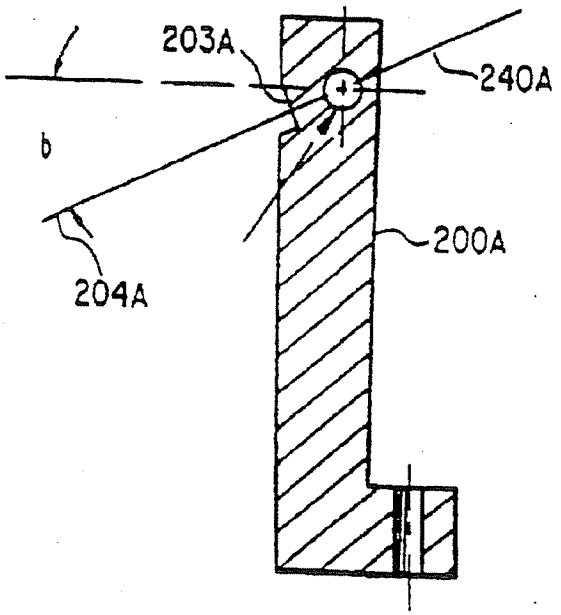

FIG. 30B